4. 33/0.415kV AUXILIARY TRANSFORMER

| 33/0.415kV AUXILIARY TRANSFORMER | | UNIT | DATA | |
| --- | --- | --- | --- | --- |
| ITEM | DESCRIPTION | ITEM | DESCRIPTION |
| 1 | System performance data |  |  |  |
| 1.1 | Nominal power rating at site conditions | KVA | 250 and 315 |  |
| 1.2 | Nominal service voltage | kVrms | 33/0.415kV |  |
| 1.3 | Max. system voltage | kVrms | 36 |  |
| 1.4 | System earthing |  | Solid |  |
| 1.5 | Rated frequency | Hz | 50 |  |
| 1.6 | 3-Phase short circuit |  |  |  |
| 1.6.1 | Rated value | kArms | 25 |  |
| 1.6.2 | Dynamic value | kApeak | 63 |  |
| 1.7 | Max radio interference level measured at 1.1 rated system voltage at 1 MHz | microV | By Manufacturer |  |
| 1.8 | Station service aux. AC supply |  |  |  |
| 1.8.1 | Rated voltage | V | 415/240 |  |
| 1.8.2 | Voltage variation | % | ±10% |  |
| 1.8.3 | Phase |  | 3 (4 wires) |  |
| 1.8.4 | Frequency | Hz | 50 |  |
| 1.8.5 | Neutral earthing |  | Solid |  |
| 1.9 | Station service aux. DC supply |  |  |  |
| 1.9.1 | Rated voltage | V | 110 |  |
| 2 | Auxiliary transformer specifications |  |  |  |
| 2.1 | Number of transformers |  | 2 |  |
| 2.2 | Manufacturer, type designation and country |  | Should be Filled By Tenderer |  |
| 2.3 | Type |  |  |  |
| 2.3.1 | Indoor/Outdoor |  | Outdoor |  |
| 2.3.2 | Stationary/Mobile |  | Stationary |  |
| 2.4 | Rated capacity of secondary winding at site conditions | kVA | 250 (Kabarnet) & 315 (Rumuruti) |  |
| 2.5 | Type of cooling |  | ONAN |  |
| 2.6 | Vector group |  | Dyn11/ Dyn11 |  |
| 2.7 | Impedance voltage between HV and LV windings at 75 °C | % | 4.5 |  |
| 2.8 | Rated voltage of windings | kVrms | 33 |  |
| 2.9 | Highest system voltages | kVrms | 36 |  |
| 2.10 | Rated frequency | Hz | 50 |  |
| 2.11 | Insulation levels |  |  |  |
| 2.11.1 | Windings (HV/LV) |  |  |  |
| 2.11.1.1 | Rated voltage | kVrms | 33/0.415 |  |
| 2.11.1.2 | Highest voltage for equipment | kVrms | 36/1 |  |
| 2.11.1.3 | Rated one min. power frequency withstand voltage | kVrms | 70/3 |  |
| 2.11.1.4 | Rated lightning impulse withstand voltage | kVpeak | 170/N.A |  |
| 2.11.2 | Bushings (HV/LV) |  |  |  |
| 2.11.2.1 | Rated voltage | kVrms | 33/0.415 |  |
| 2.11.2.2 | Highest voltage for equipment | kVrms | 36/1 |  |
| 2.11.2.3 | Rated one min. power frequency withstand voltage | kVrms | 140/10 |  |
| 2.11.2.4 | Rated lightning impulse withstand voltage | kVpeak | 325/20 |  |
| 2.12 | Tap changer |  |  |  |
| 2.12.1 | Whether manual off circuit tap changer is required | Yes/No | Yes |  |
| 2.12.2 | Type (Onload - Off load) |  | Off load |  |
| 2.12.3 | Manufacturer & country |  |  |  |
| 2.12.4 | Total range(number of steps) |  | ±2\*2.5% |  |
| 2.12.5 | Location |  | HV-N |  |
| 2.12.6 | Rated current | A | 5 (Min) |  |
| 2.13 | Losses |  |  |  |
| 2.13.1 | No load losses at 75 ºC, rated frequency and rated voltage on principal tapping | kW | Max. 0.65 |  |
| 2.13.2 | Load losses at rated frequency, 75ْ C And rated current on principal tapping | kW | Max. 3.0 |  |
| 2.13.3 | Evaluation rate of no load loss at Tendering stage | $/kW | 9000 |  |
| 2.13.4 | Evaluation rate of load loss & cooling loss at Tendering stage | $/kW | 4000 |  |
| 2.14 | Exciting current |  |  |  |
| 2.14.1 | At rated voltage | A | By manufacturer |  |
| 2.14.2 | At 110% rated voltage | A | By manufacturer |  |
| 2.15 | Temperature rise (corrected for altitude, ambient condition and IEC 60076-2) |  |  |  |
| 2.15.1 | Top oil | °C | 57 |  |
| 2.15.2 | Winding | °C | 62 |  |
| 2.15.3 | Hot Spot | °C | 75 |  |
| 2.16 | Max. sound level (acc. to IEC 60076-10) | dB | 50 |  |
| 2.17 | Vacuum withstand capacity of total transformer | mmHg | Acc. To Technical Specification |  |
| 2.19 | Core and winding data |  |  |  |
| 2.19.1 | Manufacturer of steel core material |  |  |  |
| 2.19.2 | Type of steel core lamination |  | By manufacturer |  |
| 2.19.3 | Flux density of core |  |  |  |
| 2.19.3.1 | At rated voltage | Wb/m2 | 1.727 |  |
| 2.19.3.2 | As above at 110% rated voltage | Wb/m2 | 1.9 |  |
| 2.19.4 | Thickness of steel core lamination | mm | ≤0.3 |  |
| 2.19.5 | Main limb/yoke cross section | cm2 | By manufacturer |  |
| 2.19.6 | Current density at rated power and voltage |  |  |  |
| 2.19.6.1 | HV winding | A/mm2 | By manufacturer |  |
| 2.19.6.2 | LV winding | A/mm2 | By manufacturer |  |
| 2.19.7 | Current density at rated short circuit current |  |  |  |
| 2.19.7.1 | HV winding | A/mm2 | By manufacturer |  |
| 2.19.7.2 | LV winding | A/mm2 | By manufacturer |  |
| 2.20 | Thickness of transformer plates |  |  |  |
| 2.20.1 | Tank | mm | By manufacturer |  |
| 2.20.2 | Sides | mm | By manufacturer |  |
| 2.20.3 | Bottom | mm | By manufacturer |  |
| 2.20.4 | Radiator plates | mm | By manufacturer |  |
| 2.21 | Bushings (HV/LV) |  |  |  |
| 2.21.1 | Manufacturer & country |  |  |  |
| 2.21.2 | External creepage distance | mm | min (1116) |  |
| 2.21.3 | Protected creepage distance | mm | By manufacturer |  |
| 2.21.4 | Rated normal | A | 5\420 |  |
| 2.21.5 | Short circuit current (HV) | kA | 25 |  |
| 2.21.6 | Test tap required | Yes/No | No |  |
| 2.21.7 | Rated normal/short circuit current for neutral | (A/kA) |  |  |
| 2.21.4 | Bushing type current transformers (Required) | Yes/No | Yes |  |
| 2.21.4.1 | No of cores (HV,HVN,LV,LVN) |  | According to SLD |  |
| 2.21.4.2 | Specifications |  | According to SLD |  |
| 2.22 | Type of terminals |  |  |  |
| 2.22.1 | HV |  | Air bushing |  |
| 2.22.2 | LV |  | Cable Box |  |
| 2.22.3 | HV-N |  | Air bushing |  |
| 2.22.4 | LV-N |  | Cable Box |  |
| 2.22.5 | Filling medium for cable box |  | Air |  |
| 2.23 | Overall Dimensions (H\*W\*L) | mm\*mm\*mm |  |  |
| 2.24 | Weights |  |  |  |
| 2.24.1 | Core and coils | kg | By manufacturer |  |
| 2.24.2 | Tank and fittings | kg | By manufacturer |  |
| 2.24.3 | Weight of oil | kg | By manufacturer |  |
| 2.24.4 | Total Weight of complete transformer | kg | By manufacturer |  |
| 2.25 | Regulation at full load and 75°C winding temperature |  |  |  |
| 2.25.1 | a) Unity Power Factor |  | By manufacturer |  |
| 2.25.2 | b) 0.8 PF lag |  | By manufacturer |  |
| 2.26 | Efficiency (at P.F.=1 ) |  |  |  |
| 2.26.1 | At full load | % | By manufacturer |  |
| 2.26.2 | At 3/4 full load | % | By manufacturer |  |
| 2.26.3 | At 1/2 full load | % | By manufacturer |  |
| 2.26.3 | Max. and the load at which it occurs | % | By manufacturer |  |
| 2.27 | Oil |  |  |  |
| 2.27.1 | Manufacture |  |  |  |
| 2.27.2 | Country of manufacture |  |  |  |
| 2.27.3 | Naphthenic or Paraphenic based oil |  | Naphthenic |  |
| 2.27.4 | Type – inhibited/ trace inhibited/ non-inhibited |  | non-inhibited |  |
| 2.27.5 | Details of inhibitor |  |  |  |
| 2.27.6 | Details of passivators |  |  |  |
| 2.27.7 | Viscosity at 40 °C (Acc. to ISO 3104) | mm2/s | Max. 12 |  |
| 2.27.8 | Viscosity at –30 °C (Acc. to ISO 3104) | mm2/s | Max. 1800 |  |
| 2.27.9 | Pour point (Acc. To ISO 3016) | °C | Max. -40 |  |
| 2.27.10 | Water content (Acc. To IEC 60814) | mg/kg | Max. 40 |  |
| 2.27.11 | Breakdown voltage (Acc. To IEC 60156) |  |  |  |
| 2.27.11.1 | As delivered | kV | Min. 30 |  |
| 2.27.11.2 | After laboratory treatment | kV | Min. 70 |  |
| 2.27.12 | Density at 20 °C (Acc. To ISO3675 or ISO12185) | g/ml | Max. 0.895 |  |
| 2.27.13 | DDF at 90 °C (Acc. To IEC 60247 / IEC 61620) |  | Max. 0.005 |  |
| 2.27.14 | Appearance |  | Clear, free from sediment and suspended matter |  |
| 2.27.15 | Acidity (Acc. To IEC 62021-1 / IEC 62021-2) | mg KOH/g | Max. 0.01 |  |
| 2.27.16 | Interfacial tension  (Acc. To EN 14210/ASTM D971) | mN/m | Min. 40 |  |
| 2.27.17 | Total Sulphur content  (Acc. To IP 373 / ISO 14596) | % | Max. 0.05 |  |
| 2.27.18 | Corrosive Sulphur (Acc. To DIN 51353) |  | Not corrosive |  |
| 2.27.19 | Copper Corrosion (Acc. To IEC 62535) |  | Not corrosive |  |
| 2.27.20 | Potentially corrosive Sulphur  (Acc. To IEC 62535) |  | Not corrosive |  |
| 2.27.21 | DBDS (Acc. To IEC 62697-1) | mg/kg | Not detectable ( <5 ) |  |
| 2.27.22 | Inhibitors of IEC 60666  (Acc. To IEC 60666) | % | (U) uninhibited oil  (Max. 0.01) |  |
| 2.27.23 | Metal passivator additives of IEC 60666 | mg/kg | Max. 5 |  |
| 2.27.24 | 2-Furfural and related compounds content (Acc. To IEC 61198) | mg/kg | Max. 0.05 (for each individual compound) |  |
| 2.27.25 | Oxidation stability (Acc. To IEC 61125:1992 (Method C)) |  |  |  |
| 2.27.25.1 | Test duration (for uninhibited oil) | h | 164 |  |
| 2.27.25.2 | Total acidity (Acc. To 1.9.4 of IEC 61125:1992) | mg KOH/g | Max. 1.2 |  |
| 2.27.25.3 | Sludge (Acc. To 1.9.1 of IEC 61125:1992) | % | Max. 0.8 |  |
| 2.27.25.4 | DDF at 90 °C  (Acc. To 1.9.6 of IEC 61125, Amendment 1 (2004) +IEC 60247) |  | Max. 0.5 |  |
| 2.27.26 | Flash point (Acc. To ISO 2719) | °C | Min. 135 |  |
| 2.27.27 | PCA content (Acc. To IP 346) | % | Max. 3 |  |
| 2.27.28 | PCB content (Acc. To IEC 61619) | mg/kg | Not detectable (Max. 2) |  |
| 2.27.29 | Quantity of oil |  |  |  |
| 2.27.29.1 | Main tank | Liters |  |  |
| 2.27.29.2 | Conservator | Liters |  |  |
| 2.27.29.3 | Radiator | Liters |  |  |
| 2.27.31 | Total oil required for commissioning | Liters |  |  |
| 2.27.32 | Total oil provided (including 5% extra) | Liters |  |  |
| 2.27.33 | Way of shipping |  | By drums |  |
| 2.27.34 | Total number of drums provided |  |  |  |
| 2.28 | Accessories make, type and country |  |  |  |
| 2.28.1 | Buchholz relay |  | Yes |  |
| 2.28.2 | Pressure relief device |  | Yes |  |
| 2.28.3 | Silicagel breather |  | Yes |  |
| 2.28.4 | Control Cabinet |  | Yes |  |
| 2.28.5 | Cables |  | Yes |  |
| 2.28.6 | Oil level gauge |  | Yes |  |
| 2.8.7 | Winding temperature indicator |  | Yes |  |
| 2.28.8 | Oil temperature indicator |  | Yes |  |
| 2.29 | Whether wheels are required | Yes/No | No |  |
| 2.30 | Whether switch-fuse unit is required | Yes/No | No |  |
| 2.31 | Type of conservator (Air bag/ Conventional ) |  | Conventional |  |
| 2.32 | Max. vibration (at rated condition) P-P | Micron | 50 |  |